# Investigation of Polymer Degradation by Addition of Magnesium

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**ABSTRACT**

The effect of alkali metal magnesium on polymer degradation of physico-mechanical properties of radiation-vulcanized natural rubber latex (RVNRL) films was investigated. RVNRL films were prepared by the addition of Mg of different concentrations (0–30 ppm) to natural rubber latex and irradiation with various radiation doses (0–20 kGy). The radiation doses were optimized (12 kGy), and the adverse effect of Mg was studied against a reference film prepared without metal. Tensile strength, tear strength, and cross-linking density of the irradiated rubber films were decreased with increasing metal ion concentrations and decreasing radiation doses. The mechanical properties of the films were reduced by nearly 10% for 30 ppm Mg ions and at the optimum dose. In contrast, elongation at break, permanent set, and swelling ratio of the films were increased at the same conditions. The maximum tensile and tear strengths of irradiated rubber films without additive were 29.33 MPa and 47.95 N/mm, respectively, at a radiation dose of 12 kGy, and these values were about six times higher than those of blank samples. With the addition of Mg, the corresponding values decrease continuously, and the minimum values were found to be 26.35 MPa and 42.675 N/mm, respectively. The effect of divalent alkali metal on polymer chain scission can be explained by the classical electron concept reported in this article.

**KEYWORDS**: Degradation, irradiation, magnesium, natural rubber latex

**DOI: 10.1080/1023666X.2016.1128164**